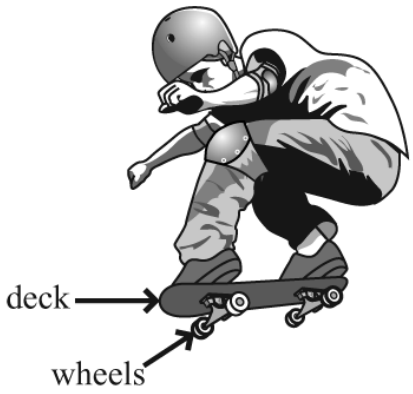
Michigan Educational Assessment Program

Science Grade 5
Scoring Guide for
Released Item #35
Forces on Skateboard
Fall 2005

MICHIGAN Department of Education

Prompt



Chris has joined a skateboarding team and purchased a new skateboard. The team captain tells Chris that being a good skateboarder means understanding and using physical science. Use your knowledge of physical science to answer the following questions.

ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER FOLDER.

Constructed-Response (3 points)

- Identify two forces that act on the skateboard as it moves down the ramp.
- Explain how these forces affect the motion of the skateboard.

NOTHING WRITTEN IN THIS TEST BOOKLET WILL BE SCORED.

Science Rubric for the Forces on Skateboard

Acceptable Responses:

Forces
- Friction
- Gravity
- Push/pull

Explanations
- Friction helps the wheels maneuver.
- Friction between Chris' foot and the ramp helps start the motion.
- Friction between the wheels of the board and the ramp acts to slow the motion down.
- Gravity acts to pull the board down the ramp.
- Gravity helps the skateboard go faster.

Scoring Guide:

3 points The student identifies two forces that act on the skateboard and explains how both forces affect the motion of the skateboard.

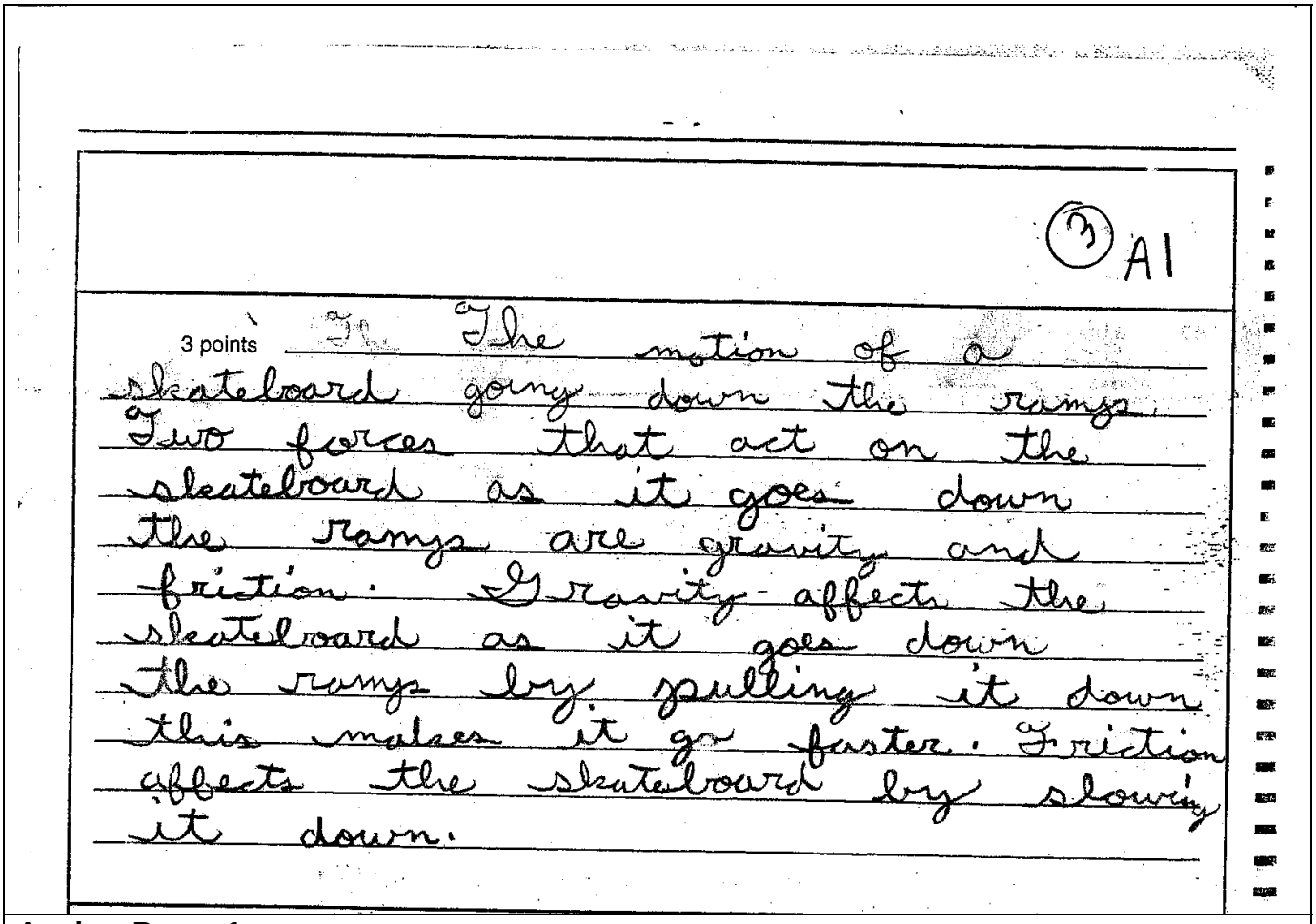
2 points The student identifies two forces that act on the skateboard one of which is explained.
OR
The student identifies one force that acts on the skateboard and explains its effect on the motion of the skateboard.

1 point The student identifies two forces that act on the skateboard.

0 points The student fails to provide any acceptable information.
OR
The student identifies one force that acts on the skateboard.
OR
The student explains one force without identifying the force.

Condition codes for unratable papers (zeroes):
A – Off Topic
B – Written in a Language other than English or Illegible
C – Blank or Refusal to Respond

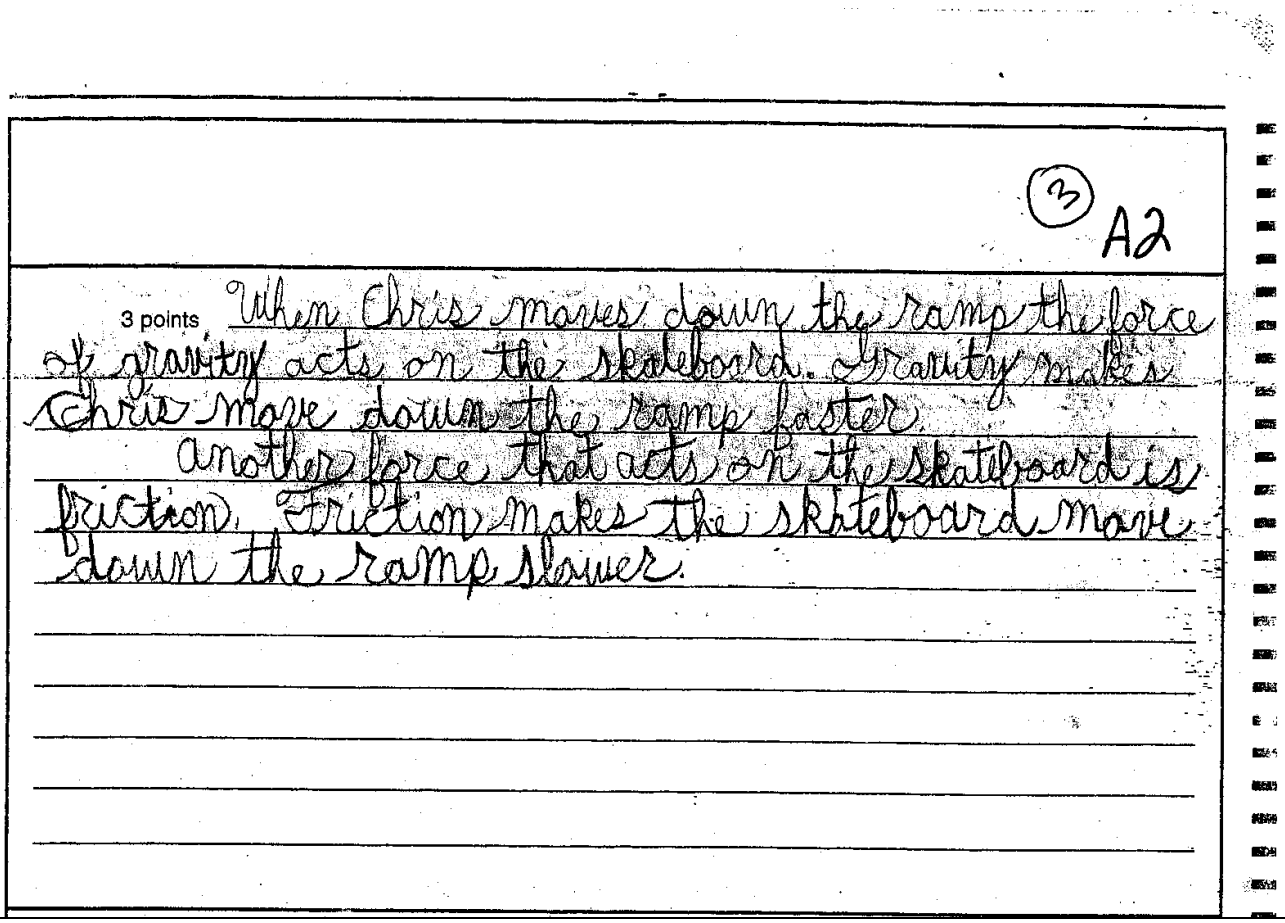
Anchor Paper 1 – Score Point 3



Anchor Paper 1
Score Point 3

The student identifies two forces that act on the skateboard *(gravity and friction),* explains how the force of gravity affects the motion of the skateboard *(Gravity affects the skateboard as it goes down the ramp by pulling it down this makes it go faster)* and explains how the force of friction affects the motion of the skateboard *(affects the skateboard by slowing it down).*

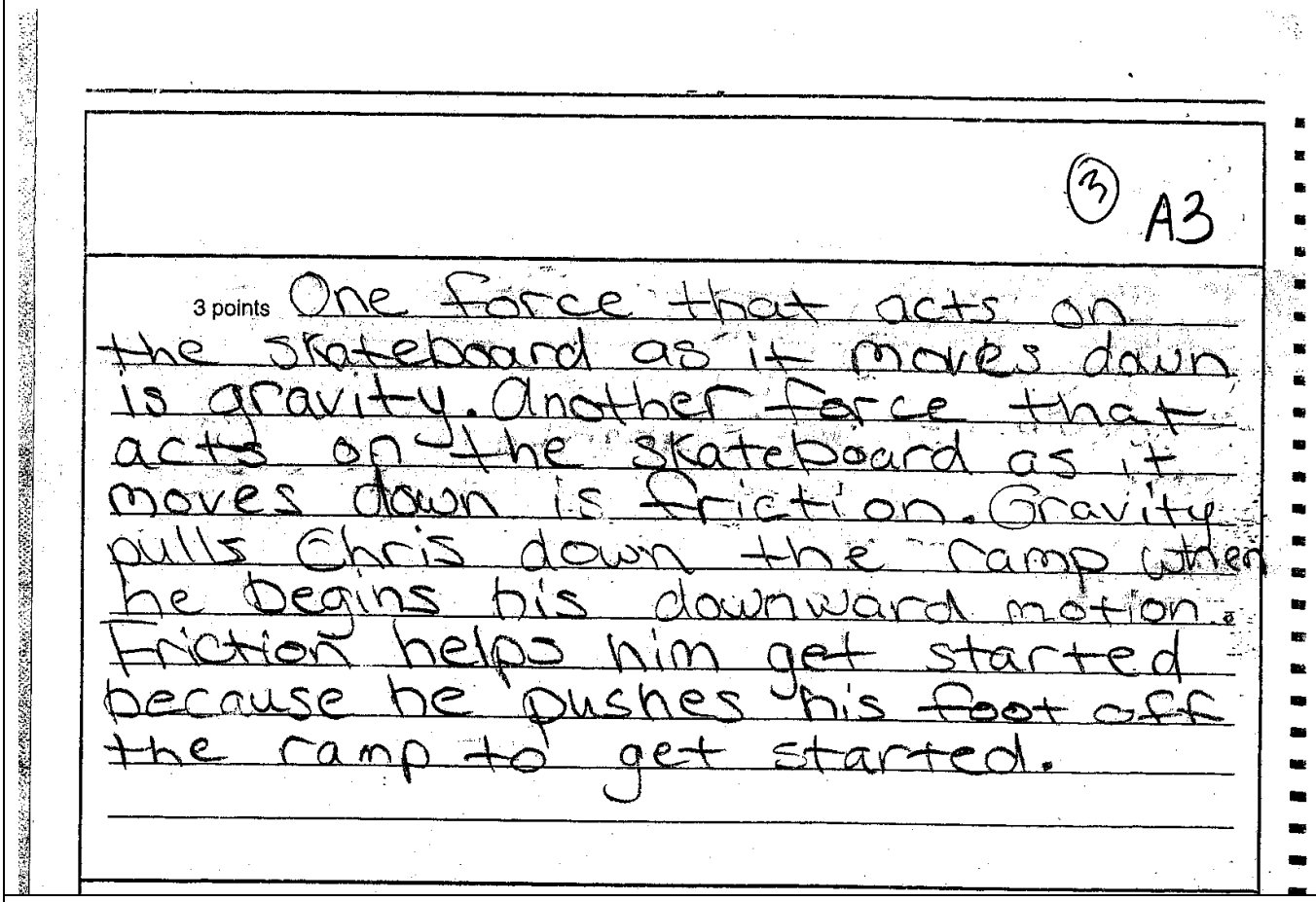
Anchor Paper 2 – Score Point 3



Anchor Paper 2
Score Point 3

The student identifies two forces that act on the skateboard *(force of gravity, friction)*, explains how the force of gravity affects the motion of the skateboard *(Gravity makes Chris move down the ramp faster)* and explains how the force of friction affects the motion of the skateboard *(Friction makes the skateboard move down the ramp slower).*

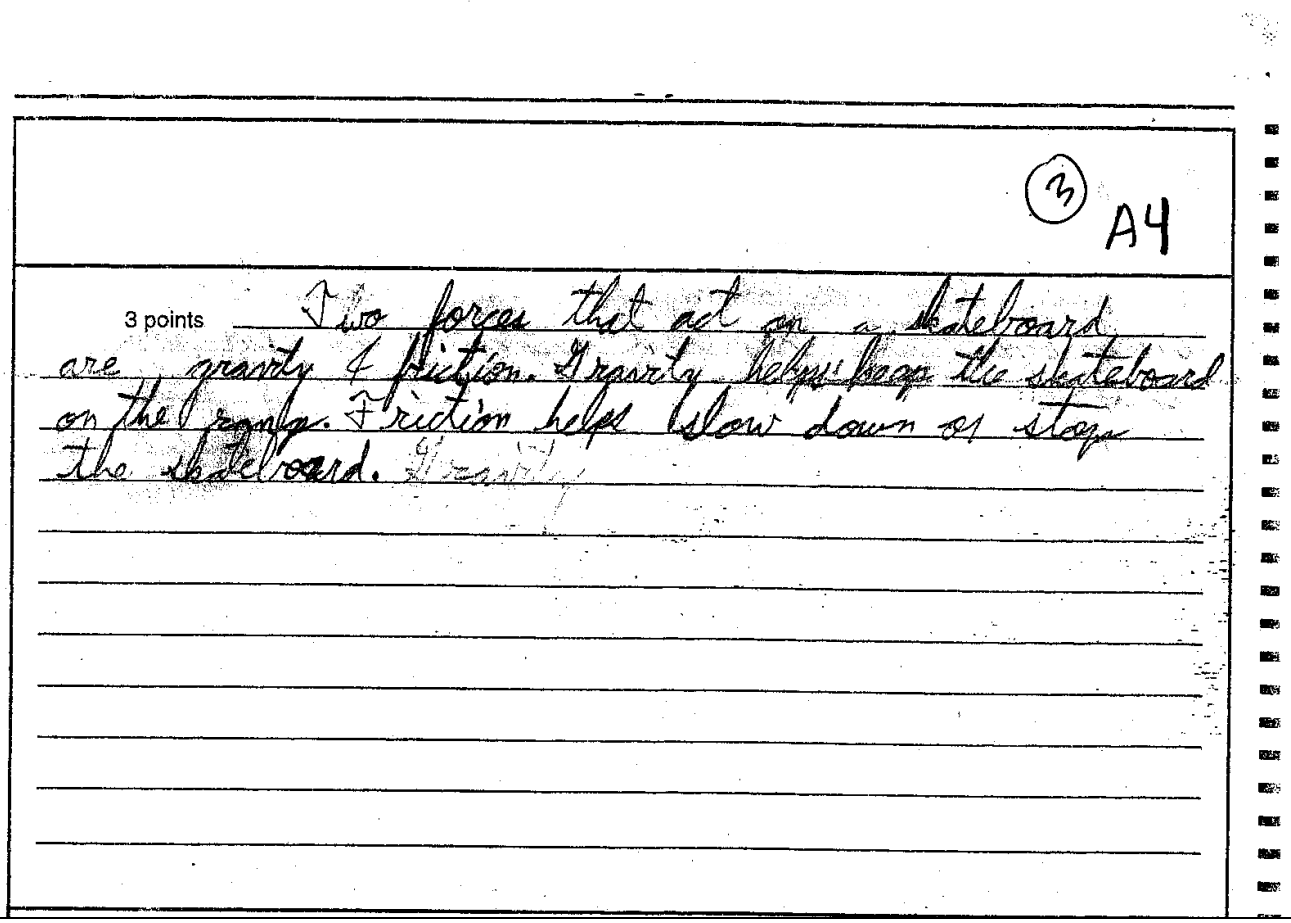
Anchor Paper 3 – Score Point 3



Anchor Paper 3
Score Point 3

The student identifies two forces that act on the skateboard *(one force is gravity....another force...is friction)*, explains how the force of gravity affects the motion of the skateboard *(Gravity pulls Chris down the ramp)* and how the force of friction affects the motion of the skateboard *(Friction helps him get started because he pushes his foot off the ramp to get started).*

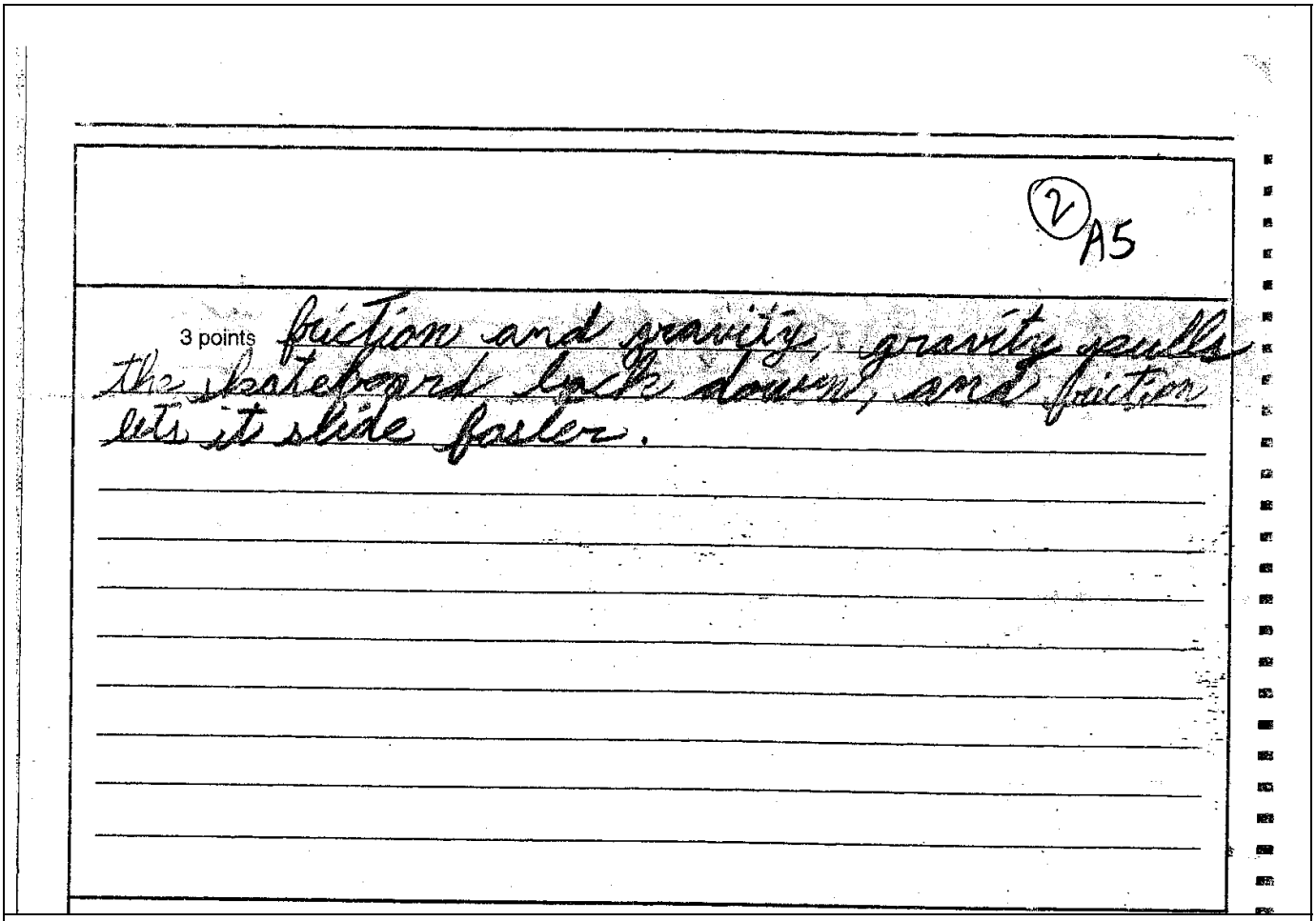
Anchor Paper 4 – Score Point 3



Anchor Paper 4
Score Point 3

The student identifies two forces that act on the skateboard *(gravity + friction)*, explains how gravity affects the motion of the skateboard (*helps keep the skateboard on the ramp)* and how the force of friction affects the motion of the skateboard *(Friction helps slow down or stop the skateboard).*

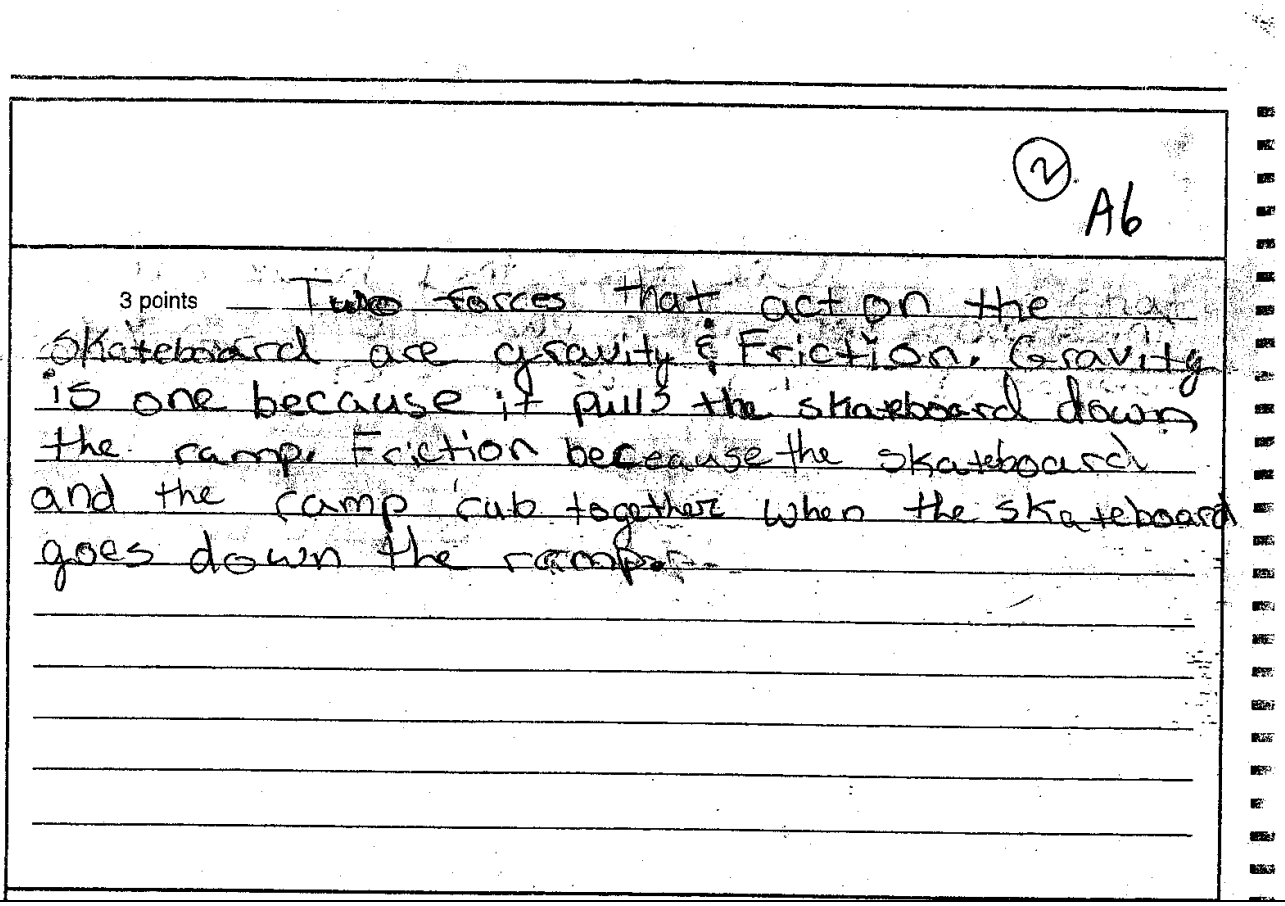
Anchor Paper 5 – Score Point 2



Anchor Paper 5
Score Point 2

The student identifies two forces that act on the skateboard *(friction and gravity)* and explains how the force of gravity affects the motion of the skateboard *(pulls the skateboard back down).* The statement "*friction lets it slide faster*" is an incorrect explanation of how friction would affect the speed of the skateboard as it moves down the ramp.

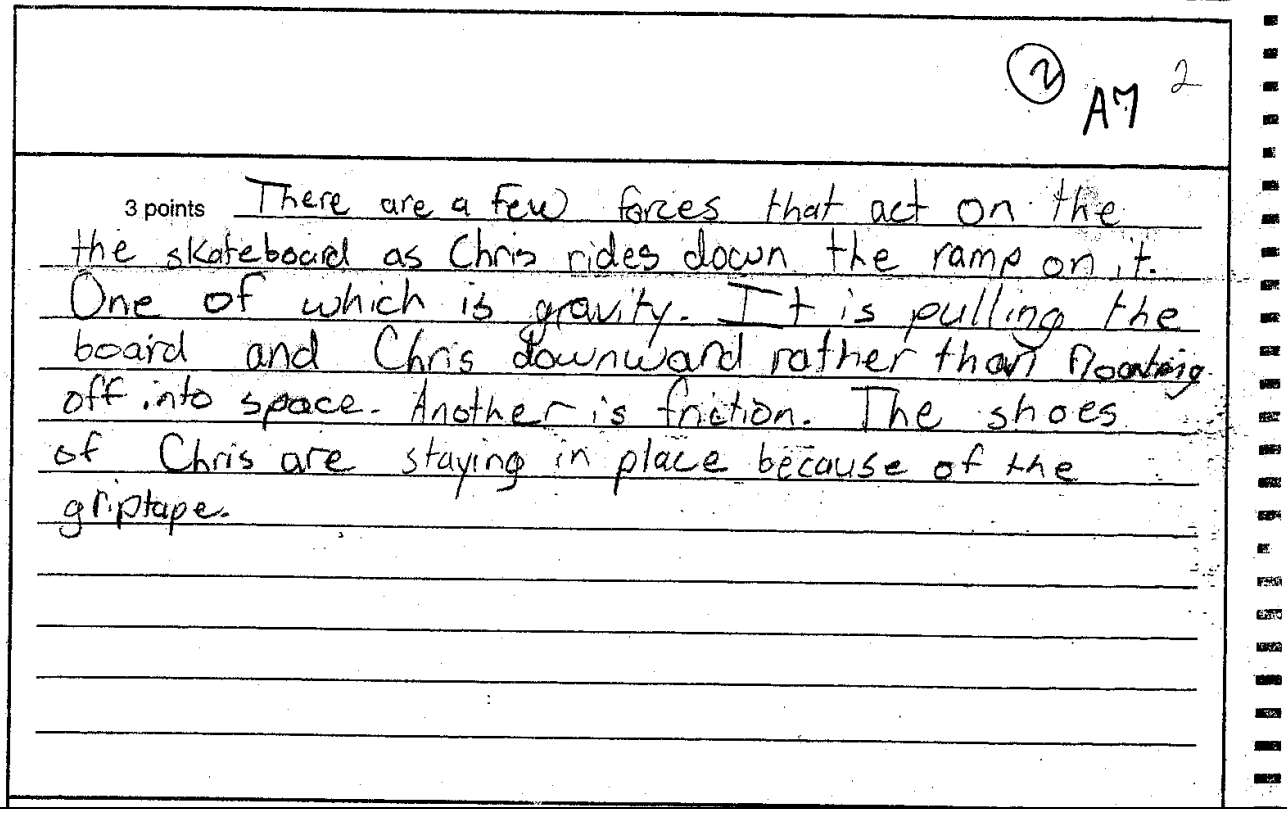
Anchor Paper 6 – Score Point 2



Anchor Paper 6
Score Point 2

The student identifies two forces that act on the skateboard *(gravity & Friction).* The response explains how the force of gravity affects the motion of the skateboard *(Gravity...pulls the skateboard down the ramp)* and attempts to explain how the force of friction affects the motion of the skateboard *(skateboard and the ramp rub together when the skateboard goes down the ramp).* The rubbing of the skateboard and ramp does cause friction, but does not sufficiently explain how this friction affects the motion of the skateboard as it goes down the ramp.

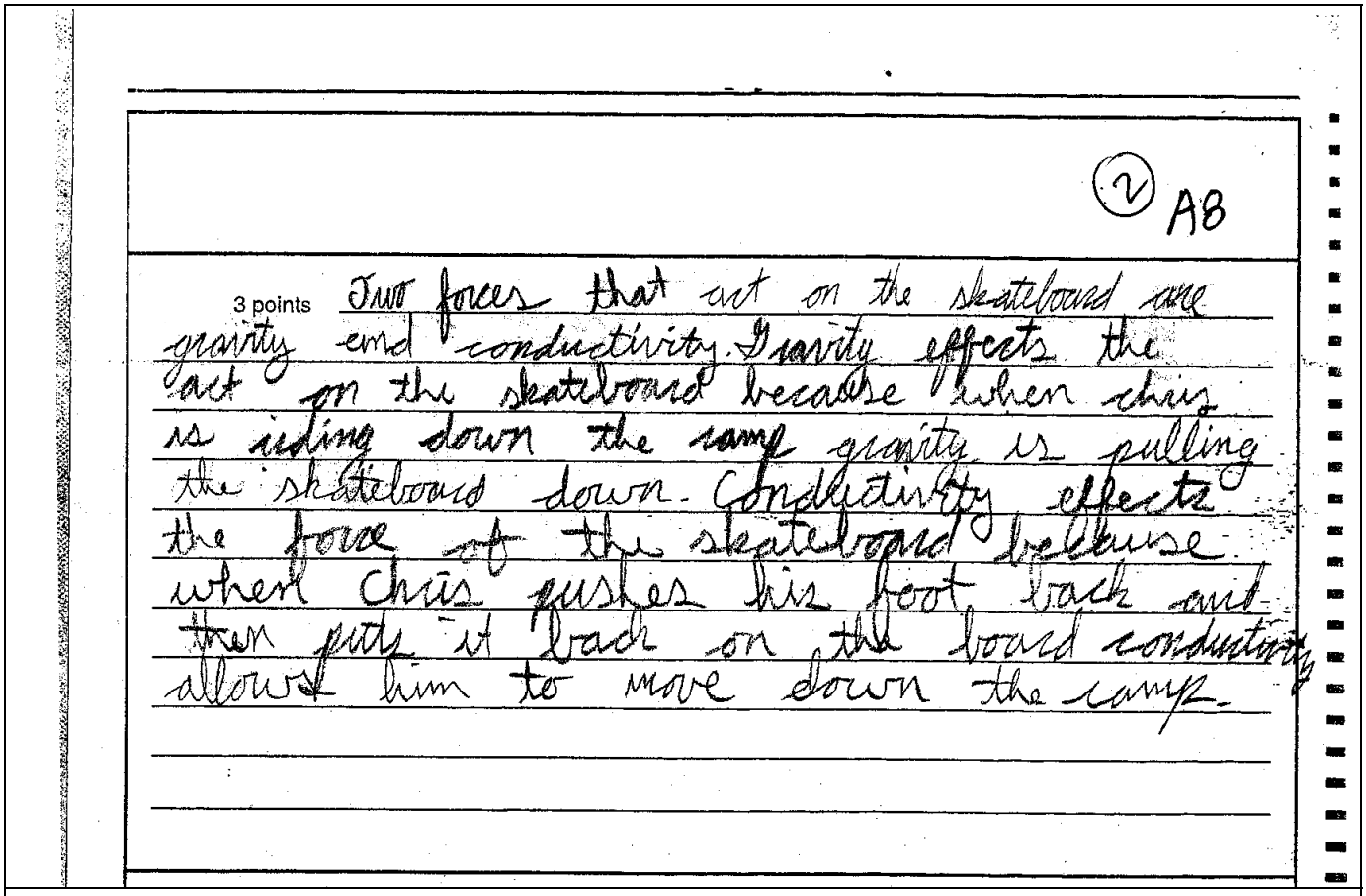
Anchor Paper 7 – Score Point 2



Anchor Paper 7
Score Point 2

The student identifies two forces that act on the skateboard *(gravity, friction).* The response explains how the force of gravity affects the motion of the skateboard *(pulling the board and Chris downward rather than floating off into space.* A description of how the force of friction affects the motion of the skateboard is attempted but incorrect *(shoes of Chris are staying in place because of the griptape).* This addresses the friction between Chris and the skateboard rather than the friction between the skateboard and ramp that affects the motion of the skateboard as it travels down the ramp.

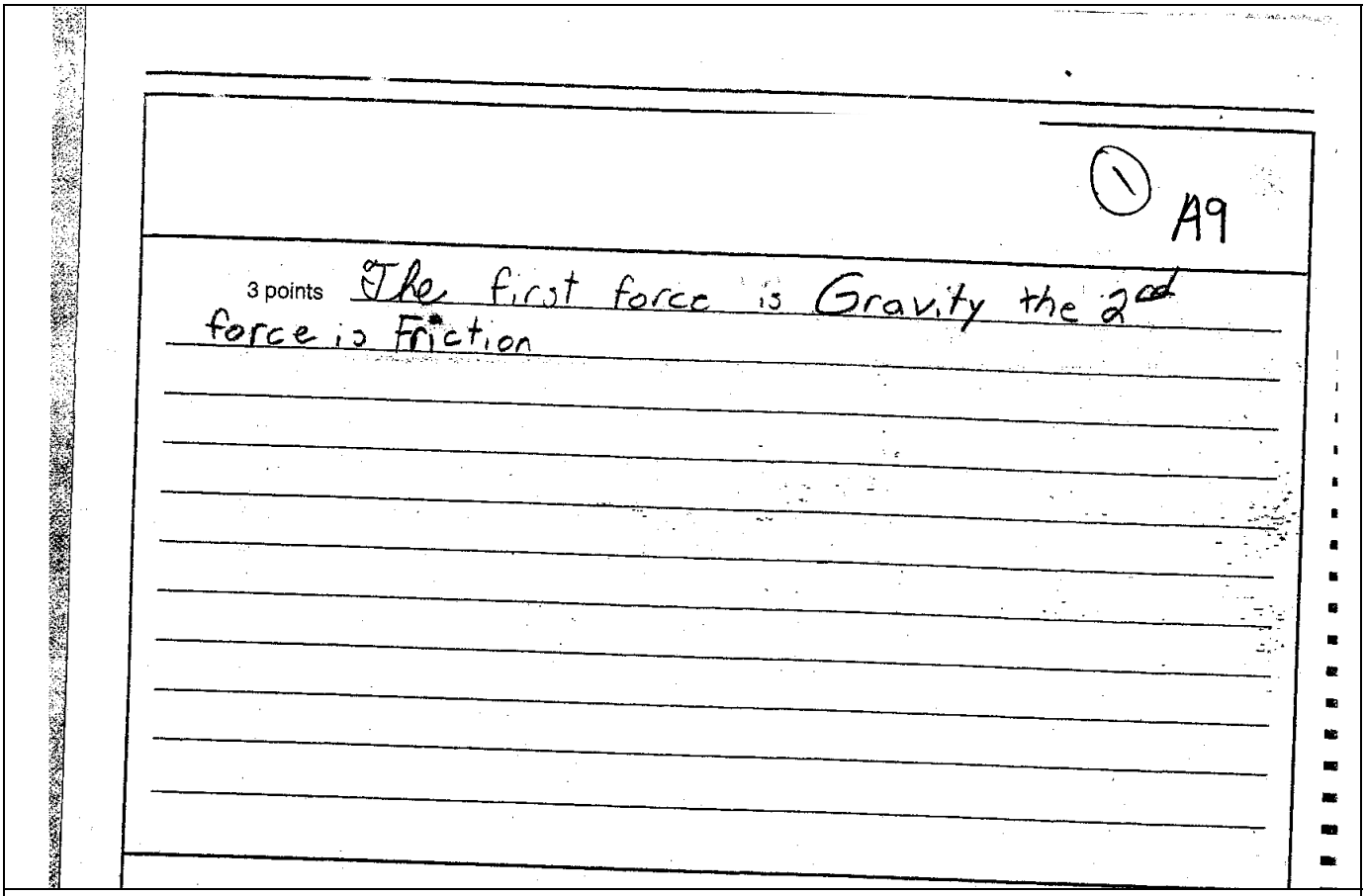
Anchor Paper 8 – Score Point 2



Anchor Paper 8
Score Point 2

The student identifies one force that acts on the skateboard *(gravity)* and incorrectly attempts to identify and explain "*conductivity*" as a force that acts on the motion of the skateboard as it moves down a ramp. The response explains how the force of gravity affects the motion of the skateboard *(gravity is pulling the skateboard down).*

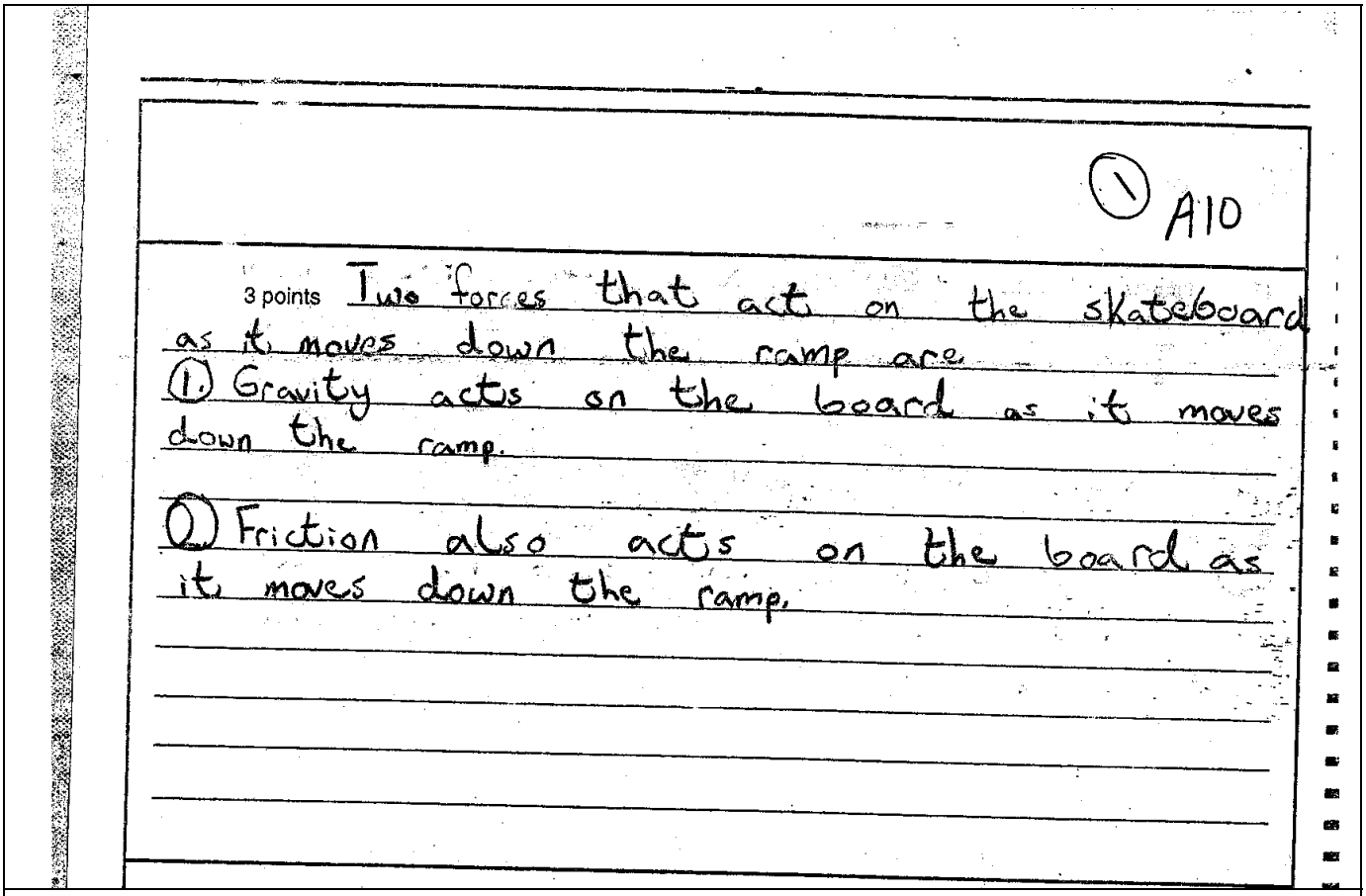
Anchor Paper 9 – Score Point 1



Anchor Paper 9
Score Point 1

The student correctly identifies two forces that act on the skateboard *(Gravity, Friction).*

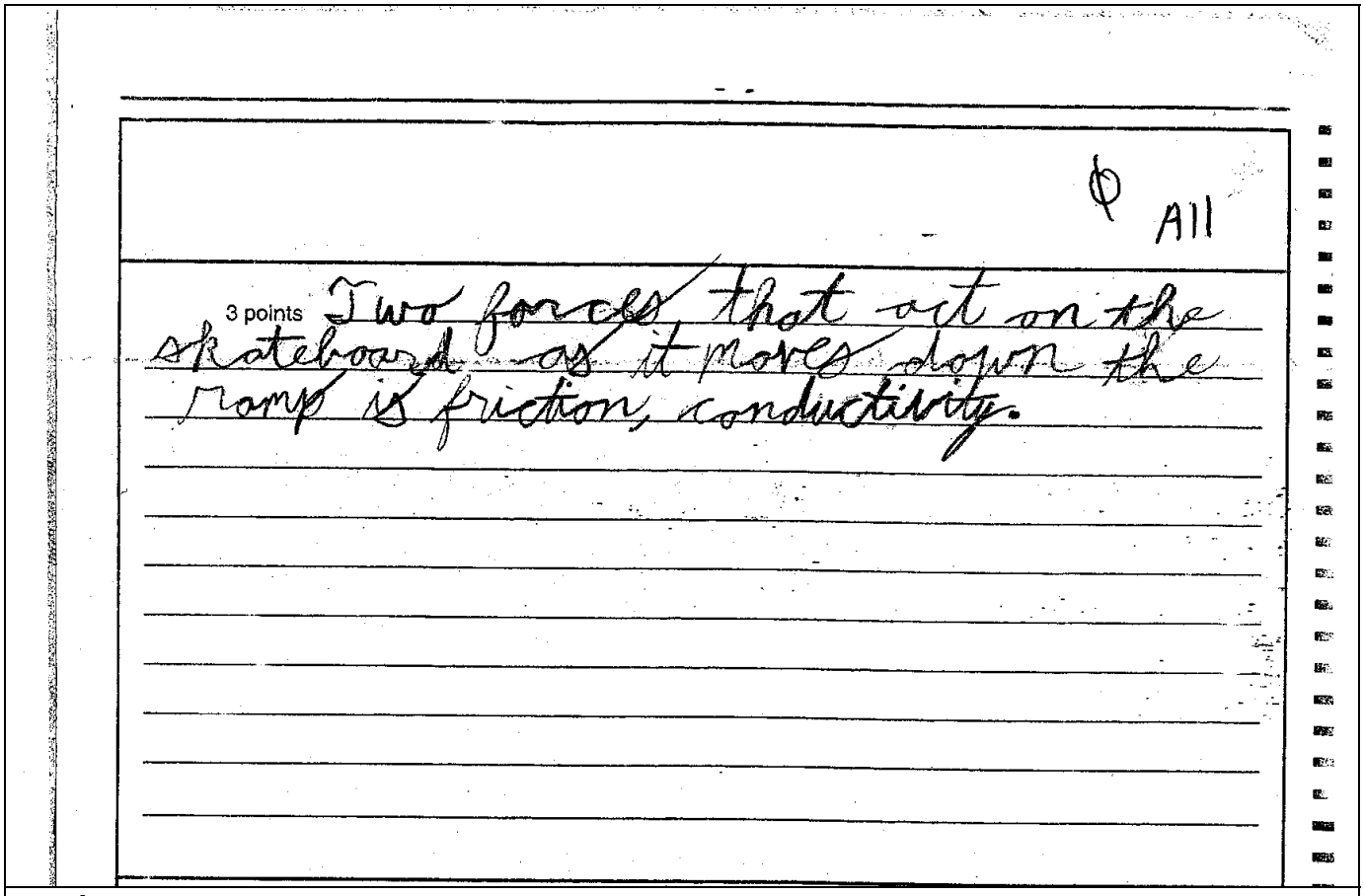
Anchor Paper 10 – Score Point 1



Anchor Paper 10
Score Point 1

The student correctly identifies two forces that act on the skateboard, *(Gravity, Friction).* The response attempts to explain how gravity and friction affect the motion of the skateboard by stating "*acts on the board as it moves down the ramp."* This statement does not explain how the motion is affected by gravity or friction, only that gravity and friction will act on the skateboard as it moves down the ramp.

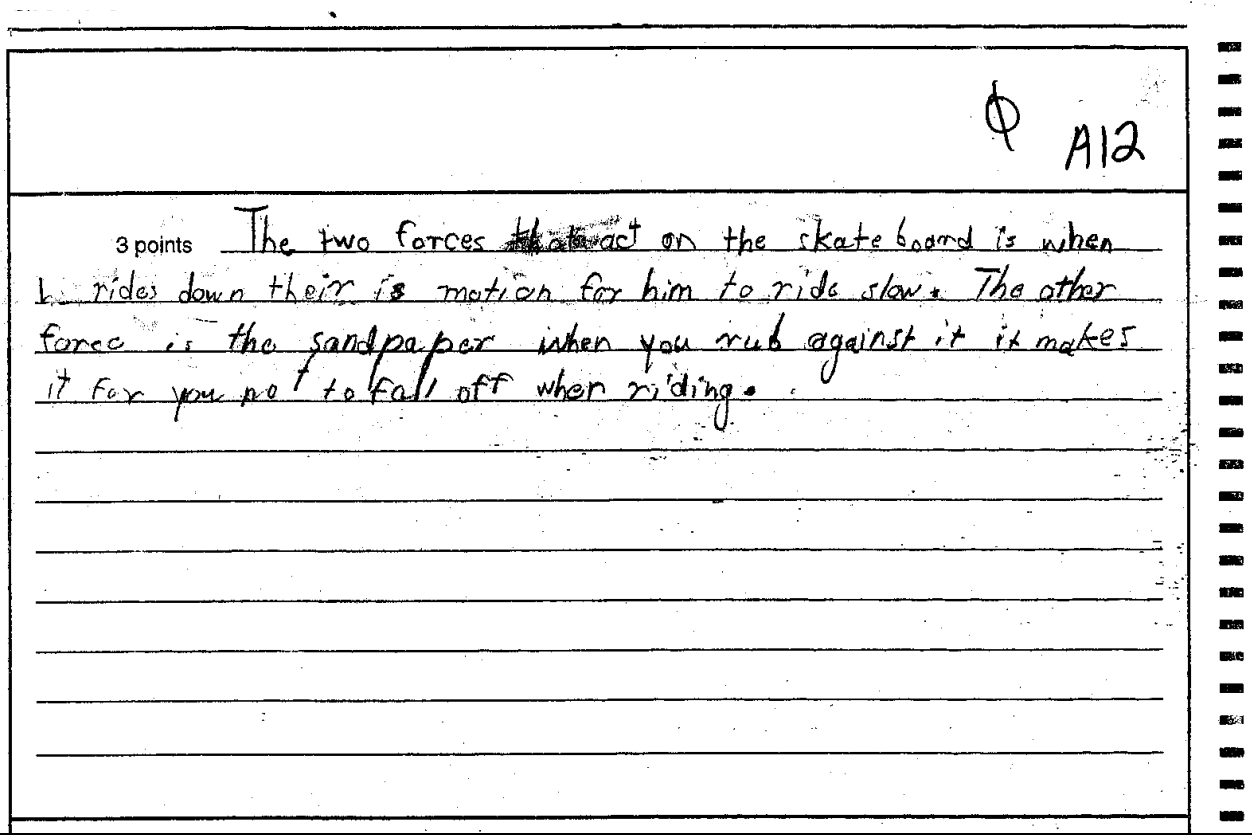
Anchor Paper 11 – Score Point 0



Anchor Paper 11
Score Point 0

The student correctly identifies one force that acts on the skateboard *(friction)* and gives a force that does not act on the motion of the skateboard, *(conductivity).* The student fails to provide explanations for the named forces.

Anchor Paper 12 – Score Point 0



Anchor Paper 12
Score Point 0

The student incorrectly identifies two forces *(motion, sandpaper)* and does not provide acceptable explanations of how these forces would affect the motion of the skateboard *(for him to ride slow....when you rub against it it makes it for you not to fall off when riding).*